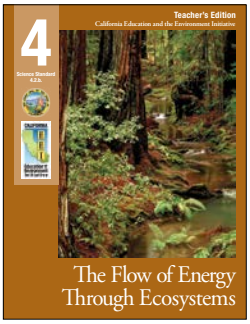
TEACH COMMON CORE STANDARDS WITH THE EEI CURRICULUM

Created with your needs in mind, this document shows the correlation between the EEI Curriculum and the California Common Core State Standards. By teaching the EEI unit lessons in your classroom, you will be simultaneously addressing the Common Core standards depicted in this guide.

4.2.b.—The Flow of Energy Through Ecosystems



In this unit, students examine the Humboldt squid and identify the nutritional needs of this mysterious animal. Students explore the roles of herbivores, carnivores, and omnivores in California's costal and marine ecosystem, as well as other natural regions. Students also discover and analyze how energy is transferred between organisms in food chains and discuss competition food sources. Finally they analyze and determine how healthy food webs can be influenced by human and natural events.

LESSONS	RI.4.1	RI.4.2	RI.4.3	RI.4.4	RI.4.7	RI.4.8	RI.4.9	W.4.1	W.4.2	W.4.7	W.4.8	SL.4.1	SL.4.2	SL.4.4	SL.4.5	L.4.3	L.4.4
California Connections	✓			✓	✓							✓		✓	✓		✓
1	✓			✓	✓							✓		✓	✓		✓
2				✓	✓						✓	✓					✓
3			✓	✓	✓		✓		✓			✓	✓	✓		✓	✓
4		✓	✓	✓	✓	✓			✓		✓		✓				✓
5	✓		✓	✓	✓				✓	✓	✓	✓	✓				✓
Traditional Assessment					✓			✓	✓								
Alternative Assessment									✓		✓						

COMMON CORE STANDARDS

Note: *For your reference, the list of California Common Core State Standards abbreviations is on the following page.*

Using the EEI-Common Core Correlation Matrix

The matrix on the front page identifies a number of Common Core standards that are supported by this EEI unit. However, the check marks in the matrix do not necessarily signify that the Common Core standards checked will be taught to mastery by using this EEI unit alone. Teachers are encouraged to select which Common Core standards they wish to emphasize, rather than teaching to every indicated standard. By spending more time on selected standards, students will move toward greater Common Core proficiency in comprehension, critical thinking and making reasoned arguments from evidence. Teaching this EEI unit will provide opportunities for teachers to implement the shift in instructional practice necessary for full Common Core implementation.

California Common Core State Standards Abbreviations

- **CCCSS:** California Common Core State Standards
- **L:** Language Standards
- **RI:** Reading Standards for Informational Text
- **SL:** Speaking and Listening Standards
- **W:** Writing Standards

Note: *Since each Common Core standard includes a breadth of skills, in this correlation, the portion of the standard description that is featured in the Common Core Standards and Applications is cited, using "…" to indicate omitted phrases. For a list of the complete standard descriptions, please see the Common Core Reference Pages located on pages 22–23 of this document.*

A Note about Common Core Speaking and Listening Standards

Many of the EEI units provide various learning structures, materials, and groupings that lead toward students working in pairs or small groups to discuss concepts and ideas. This supports the skill in Speaking and Listening Standard 1 "Participate effectively in a range of collaborative discussions (one-on-one, groups…) with diverse partners." With prior instruction in collaborative discussion techniques, students can be placed in pairs or small groups to discuss the lesson topics. To aid in teacher planning, the lessons are listed below along with their learning structures for whole class, pairs/partners, and/or small groups:

- **Lesson 1:** Whole class, partners (optional)
- **Lesson 2:** Whole class, 10 small groups
- **Lesson 3:** Whole class, partners (optional)
- **Lesson 4:** Whole class, various students for a game
- **Lesson 5:** Whole class, two large groups pairs within two groups

National Geographic Resources

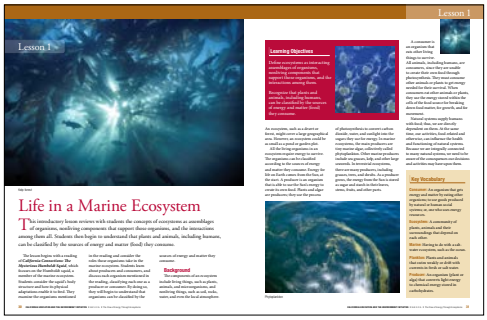
- **Natural Regions** wall map (Lesson 1)

Unit Assessment Options

Assessments	Common Core Standards and Applications
Traditional Assessment	
Traditional assessment is comprised of multiple choice, matching, and short answer questions that assess students' achievement of the unit's learning objectives.	**RI.4.7:** Interpret information presented visually…and explain how the information contributes to an understanding of the text in which it appears. **W.4.1b:** Provide reasons that are supported by facts and details. **W.4.2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
Alternative Assessment	
In An Ecosystem Far, Far Away has students categorize species from another planet as well as building a food web and answering questions on what would happen if that web was disrupted.	**W.4.2d:** Use precise language and domain-specific vocabulary to inform about or explain the topic. **W.4.8:** Recall relevant information from experiences or…print…and categorize information…

Lesson 1: Life in a Marine Ecosystem

Students read California Connections: The Mysterious Humboldt Squid. They describe the squid and draw sketches of it. They identify producers and consumers in the squid's ecosystem. They identify organisms the squid feeds on, as well as those that feed on it.


Lesson 1

Life in a Marine Ecosystem

Learning Objectives

Key Vocabulary

National Geographic Resources

- **Natural Regions** wall map

Use this correlation in place of the **Procedures** on pages 34–35 of the Teacher's Edition.

Procedures	Common Core Standards and Applications
Vocabulary Development	
Use the **Dictionary** and the vocabulary **Word Wall Cards** to introduce new words to students as appropriate. These documents are provided separately. ***Tip: Word Wall Cards*** *may be used at the beginning, as the words come up in the lesson, or as a review at the end.* ***Tip:*** *If* ***Dictionary*** *needs to be reused from year to year, students should not write in them.*	**L.4.4c:** Consult reference materials…to…determine or clarify the precise meaning of key words and phrases… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 1	
Ask students to gather around the **Natural Regions** wall map and ask which natural region makes up most of the state. (*Students will most likely say, "desert," "grasslands," or "forest."*) Tell students that one of the largest natural regions in our state is the ocean region. Point out how much coastline California has. Point to the inset on the map titled "Ocean Regions Classification by Light Level." Tell students that today they are going to read about one of the organisms in this picture, an organism that is one of the most mysterious on the planet. Have students return to their seats. Distribute a **Student Workbook** to each student. Tell students to turn to ***California Connections: The Mysterious Humboldt Squid*** (Student Workbook, pages 2–6). Read the article aloud as a class.	**RI.4.7:** Interpret information presented visually…

Procedures	Common Core Standards and Applications
Step 1 (Continued):	
Tip: *If* ***Student Workbooks*** *need to be reused from year to year, students should not write in them. Some strategies teachers use to preserve the workbooks are:* ■ *Have students use binder paper or other lined or unlined paper* ■ *Have students use a sheet protector over the page and write with a whiteboard marker* ■ *Do together as a class on a projector or chart paper* ■ *Project the digital fill-in version and do together as a class* ■ *Students use digital devices to fill in the digital version found on the website.* ■ *Make student copies when necessary*	**RI.4.7:** Interpret information presented visually…
Step 2	
Distribute blank paper and colored pencils, have students draw a quick sketch of the Humboldt squid based on the descriptions in the article. Ask for volunteers to describe the squid. Examples include: ■ The Humboldt squid has huge eyes. ■ It can grow up to six feet in length. ■ It can weigh over 100 pounds. ■ Its body is soft and tubelike, with fins that form a diamond shape. ■ It has 10 tentacles (arms); two of the tentacles are much longer. ■ The arms have barbed suckers on them. ■ The barbs are very sharp, like teeth.	**RI.4.1:** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. **SL.4.5:** Add…visual displays to presentations…
Step 3	
Ask for volunteers to describe how the squid's body parts enable it to feed. Examples include: ■ The squid uses barbs on its two longer tentacles to grab food and drag it into its mouth. ■ Its mouth has a sharp beak that bites and tears the food into tiny pieces. Project **Humboldt Squid** (Visual Aid #1). Have students compare this photo of the Humboldt squid with their sketches. Have students pay special attention to the body parts that enable the squid to consume food. Allow students to add missing details to their drawings.	**SL.4.1c:** …respond to specific questions…and make comments that contribute to the discussion and link to the remarks of others.

Procedures	Common Core Standards and Applications
Step 4	
Review the term and definition for "ecosystem" on the **Word Wall**. Reinforce for students that ecosystems are systems of living and nonliving things found together. Ask for volunteers to give some examples of ecosystems. (*Pond, forest, desert, backyard garden, prairie, or river*) Explain that the Humboldt squid lives in a marine ecosystem, and that the lesson looks more closely at some of the organisms that are part of the ecosystem in which the Humboldt squid lives.	**L.4.4c:** Consult reference materials…to…determine or clarify the precise meaning of key words and phrases…
Step 5	
Project **Producer** (Visual Aid #2) and introduce the term to the class. Use **Producer** to describe how a producer creates its own food by converting the Sun's light energy into sugars. Explain that for an ecosystem to function there must be producers in it. Have students reread the ***California Connections: The Mysterious Humboldt Squid***. Instruct them to use the green marker to highlight (or underline) each producer in the article.	**RI.4.1:** Refer to details…in a text when explaining what the text says explicitly and when drawing inferences from the text. **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text… ***Suggestion:*** *Have students locate the word producer in the text and, with a partner, determine the meaning of the word using context clues. Call on students to give their definitions and evidence from the text as to where they determined the definition.*
Step 6	
Introduce the term "consumer." Ask students whether the Humboldt squid is a producer or a consumer. (*It is a consumer.*) Have the students go back to ***California Connections: The Mysterious Humboldt Squid*** and highlight (or underline) all consumers listed in the article in yellow.	**RI.4.1:** Refer to details…in a text when explaining what the text says explicitly and when drawing inferences from the text. ***Suggestion:*** *Have students, either individually or with a partner, prove with evidence from the text and using the definition of consumer that the Humboldt squid is a consumer. They can quote or infer using evidence from* ***California Connections*** *or other web resources. To go one step further, students can determine whether the squid is a primary, secondary, or tertiary consumer and present proof.*
Step 7	
Point out that the Humboldt squid eats organisms within the ecosystem, and that the squid are also eaten by other organisms. Ask students to name some of the consumers the squid eats. (*Lanternfish, shrimp, mollusks, sardines, krill, Pacific hake, and anchovies*) Ask students to name some of the consumers that eat squid. (*Whales, seals, swordfish, sharks, porpoises, marlin, and human beings*) Point out that human beings are also consumers and are a part of the ecosystem in which squid and other marine organisms live.	**SL.4.4:** Report on a topic…in an organized manner, using appropriate facts… ***Suggestion:*** *Refer to the definitions in the previous lesson on food chains and review with students. Have them orally, or visually, describe what the Humboldt squid's food chain might look like.*
Step 8	
Gather the student sketches of the Humboldt squid to decorate the **Word Wall**. Collect **Student Workbooks** and use ***California Connections: The Mysterious Humboldt Squid*** for assessment.	n/a

Lesson 2: In Ecosystems Everywhere…

Students revisit the marine ecosystem and the producers and consumers they have learned about. They learn about herbivores, carnivores, and omnivores, and classify organisms in ecosystems found in California's other natural regions.

Use this correlation in place of the **Procedures** on pages 48–50 of the Teacher's Edition.

Procedures	Common Core Standards and Applications
Vocabulary Development	
Use the **Dictionary** and the vocabulary **Word Wall Cards** to introduce new words to students as appropriate.	**L.4.4c:** Consult reference materials…to…determine or clarify the precise meaning of key words and phrases… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 1	
Project **Marine Organisms** (Visual Aid #3). Review the variety of the organisms in the marine ecosystem based on what they consume (as producers or consumers). Explain that consumers can be grouped according to the types of food they consume. Introduce the terms and definitions for "herbivore," "carnivore," and "omnivore."	**L.4.4c:** Consult reference materials…to…determine or clarify the precise meaning of key words and phrases…
Step 2	
Tell students about each of the living things on **Marine Organisms** using the information below. Point to each one as you read the descriptions of its feeding behavior. After each description is read, ask for a volunteer to explain whether the organism is a producer or consumer, and if the student says "consumer," then ask whether it is an herbivore, a carnivore, or an omnivore: ■ Algae—I take the Sun's energy and CO_2 and make food from it. I do not need to eat other organisms. (*Algae is a producer.*) ■ Sea urchin—I get my energy by eating kelp and algae. (*A sea urchin is a consumer; it is a consumer called an herbivore.*) ■ Orca (killer whale)—I get my energy by eating krill, Humboldt squid, sardines, seals, and filetail catsharks. (*An orca is a consumer; it is a consumer called a carnivore.*) ■ Shrimp—I get my energy by eating small plants and animals. (*A shrimp is a consumer; it is a consumer called an omnivore.*)	**SL.4.1c:** …respond to specific questions to…follow up on information…

Procedures	Common Core Standards and Applications
Step 3	
Point to the **Organisms and Ecosystems Chart** and tell students that they will use this tool to put different types of organisms into groups. Ask a volunteer to explain where a marine ecosystem might be located. (*It might be found in the ocean.*) Point out the **Natural Regions** wall map and explain to students that, as they saw in the last lesson, the "Ocean and Coast" region is just one of the natural regions in California. Point to the row on the **Organisms and Ecosystems Chart** labeled "Ocean and Coast" and tell students that, in ocean and coastal ecosystems, as they just said, there are organisms that are producers and organisms that are consumers. Direct students to look carefully at **Marine Organisms** and help you fill in this row on the chart. "Which organism is a producer in the marine ecosystem?" (*That organism is algae.*) Tape "algae" in place in the "Producers" column in the "Ocean and Coast" row on the chart. Ask students to name an herbivore from **Marine Organisms**. (*The sea urchin is an herbivore.*) Post the "sea urchin" in the "Herbivores" column. Ask students, "What is the Humboldt squid?" (*It is a carnivore.*) Point to the "Carnivores" row in the same column. Tell students that the Pacific hake and the orca would also go here, since they are carnivores, too. Tape "carnivores" in place in this space. Ask students to name an omnivore from **Marine Organisms**. (*Shrimp are omnivores.*) Tape "shrimp" it in the "Omnivores" column on the chart.	**W.4.8:** Recall relevant information from…print and digital sources;…categorize information…
Step 4	
Explain to the class that they will take a quick journey to the other natural regions in California to learn about the different organisms that live in that region as well as the ecosystems found there. They will help complete the **Organisms and Ecosystems Chart** by writing the names of organisms that are producers and consumers on drawing paper, then placing the name of the organism on the **Organisms and Ecosystems Chart** in the columns for the natural region with their ecosystem. Redistribute the students' individual **Student Workbooks**.	**RI.4.7:** Interpret information presented visually…and explain how the information contributes to an understanding of the text… **SL.4.1:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly. a) Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b) Follow agreed-upon rules for discussions and carry out assigned roles. c) Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others. d) Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

Procedures	Common Core Standards and Applications
Step 4 (Continued):	
Organize the class into ten groups and assign one of ten natural regions to each group. Tell each group to turn to the natural region that you assigned them: ■ **Alpine Meadow** (Student Workbook, page 7) ■ **Grasslands** (Student Workbook, page 8) ■ **High Desert** (Student Workbook, page 9) ■ **Low Desert** (Student Workbook, page 10) ■ **Mixed Evergreen and Conifer Forest** (Student Workbook, page 11) ■ **North Coastal Forests (Redwoods)** (Student Workbook, page 12) ■ **Oak Woodland** (Student Workbook, page 13) ■ **Rivers and Lakes** (Student Workbook, page 14) ■ **Sagebrush Scrub and Pinyon-Juniper Woodland** (Student Workbook, page 15) ■ **Scrubland and Chaparral** (Student Workbook, page 16) Tell each group to read about how the organisms in their assigned natural region, get energy. Tell them to work together to decide whether each organism is a producer or consumer, and to enter their answers in the "What Am I?" column of their **Organisms and Ecosystems Chart**. Tell students that if they say an organism is a consumer, then they have to decide if it is an herbivore, a carnivore, or an omnivore. Explain that once they decided, they should also write the appropriate letter "H" (herbivore), "C" (carnivore), or "O"(omnivore) in the third column, next to the word "consumer" in the "What Am I?" column. Give the groups 15 minutes to complete this task.	**RI.4.7:** Interpret information presented visually…and explain how the information contributes to an understanding of the text… **SL.4.1:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly. a) Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b) Follow agreed-upon rules for discussions and carry out assigned roles. c) Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others. d) Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
Step 5	
Once the groups have completed their classifications, distribute four half-sheets of paper and four different colored markers to each group. Explain to students that they should use the marker color that corresponds with the colors used in the **Organisms and Ecosystems Chart**. On the second sheet, have them use the designated color marker to write the names of all of the herbivores from their region. Have students continue to write the names of all of the carnivores and omnivores from their regions on the third and fourth sheets, again using the designated colors. As groups complete their sheets, have them come to the chart and tape them in the correct row. (*Note: An Answer Key and Sample Answers for the **Organisms and Ecosystems Chart** is provided on pages 51–52.*)	n/a

Procedures	Common Core Standards and Applications
Step 6	
After each group has placed their sheets on the **Organisms and Ecosystems Chart**, ask students what they notice about the organisms in each natural region. (*There are producers and consumers in all of them.*) Point out that the chart shows that while the organisms in different ecosystems vary, there are producers and consumers that are herbivores, carnivores, and omnivores in all ecosystems, in all regions. (*Note: Although there are not any carnivores described in the article about the Sagebrush Scrub and Pinyon-Juniper Woodland, carnivores, such as the bobcat, live there.*) Ask students, "Where do humans belong on this chart?" (*They belong in all the regions.*) Are humans producers or consumers? (*We are consumers.*) Are we herbivores, omnivores, or carnivores?" (*People who are vegans could be considered herbivores, but humans as a species are omnivores.*)	**SL.4.1c:** Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others. **SL.4.1d:** Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
Step 7	
Collect **Student Workbooks** and use **Alpine Meadow, Grasslands, High Desert, Low Desert, Mixed Evergreen and Conifer Forest, North Coastal Forests (Redwoods), Oak Woodland, River and Lakes, Sagebrush Scrub and Pinyon-Juniper Woodland,** and **Scrubland and Chaparral** for assessment.	n/a

Lesson 3: Eat or Be Eaten

Students help identify and analyze food chains and food webs in a marine ecosystem, and they discuss competition for food sources. They then analyze a food web and answer the questions about limited supplies of food.


Lesson 3

Lesson 3

Eat or Be Eaten

Learning Objectives

Background

Key Vocabulary

Use this correlation in place of the **Procedures** on pages 70–71 of the Teacher's Edition.

Procedures	Common Core Standards and Applications
Vocabulary Development	
Use the **Dictionary** and the vocabulary **Word Wall Cards** to introduce new words to students as appropriate.	**L.4.4c:** Consult reference materials…to…determine or clarify the precise meaning of key words and phrases… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 1	
Call students' attention to the **Organism Bank** (Information Cards #1–14) on the board (*or other area*). Ask students, "In which of the natural regions in California would these organisms be found?" (*Ocean and Coast region; the ocean*)	**SL.4.1c:** …respond to specific questions…and make comments that contribute to the discussion and link to the remarks of others. **SL.4.2:** Paraphrase…information presented in diverse media and formats, including visually, quantitatively, and orally.
Step 2	
Redistribute the students' individual **Student Workbooks**. Tell them to turn to **Where I Get Energy** (Student Workbook, page 17). Using the **Where I Get Energy** as a guide, call on a few students to come up and select two organisms in the "Organism Bank" that have a feeding relationship: ■ Direct the students to use the open space on the board to put the two organisms they have selected from the **Organism Bank** information cards in line with each other. If the two organisms have no direct feeding connection, guide the class into suggesting replacement information cards. ■ Step in to indicate the feeding connection by making an arrow between the two organisms (string or yarn), pointing in the direction of the energy flow. (*Note: Do not explain the use of arrows, yet.*) ■ Once two organisms are correctly connected, return the information cards to the "Organism Bank" and have students return to their seats.	**RI.4.3:** Explain…ideas, or concepts in a…scientific…text, including what happened and why, based on specific information in the text. ***Suggestion:*** *Have students discuss which organisms have a feeding relationship before calling individual students up to the board.*

Procedures	Common Core Standards and Applications
Step 3	
After several students have volunteered to connect two organisms in the manner detailed above, call on several students to connect three organisms from the "Organism Bank" in the same manner: ■ Direct the students to use the open space to put the three information cards in line with one another. ■ Step in to connect the information cards with arrows. (*Note: Do not explain the arrows yet.*) ■ Once three organisms are correctly connected, return the information cards to the "Organism Bank" and have students return to their seats.	**RI.4.3:** Explain…ideas, or concepts in a…scientific…text, including what happened and why, based on specific information in the text.
Step 4	
After several students have volunteered to connect three organisms, call on the class to help connect four organisms. Use the open space to put four information cards in line with one another. Call on students to come to the front and use the string or yarn to connect the four organisms. Tell students that the "arrows" in these kinds of diagrams always point in the direction that the energy is flowing in the form of food, that it is, the arrow points to the organism that it is eating and away from the organism that is being eaten. Check that the arrows are correctly drawn in the four-organism food chain the class has constructed. Leave the four-organism chain on the board. Ask students to give an example of an organism that could have several arrows pointing away from it. Then, ask them to give an example of an organism that could have several arrows pointing toward it. Have them explain their examples. Ask students if humans belong in any of the food chains they created. (*Humans eat many of the species listed.*)	**RI.4.3:** Explain…ideas, or concepts in a…scientific…text, including what happened and why, based on specific information in the text. **SL.4.4:** Report on a topic or text…using appropriate facts and relevant, descriptive details to support main ideas or themes…
Step 5	
Review the vocabulary terms "food chain," "food web," and "compete." Point out to students that they have been making food chains with marine organisms. Ask students, "How are food chains different from food webs?" If necessary, explain that food webs show organisms with the same food sources, which means that they are competing with one another for food.	**L.4.4c:** Consult reference materials…to…determine or clarify the precise meaning of key words and phrases… **RI.4.7:** Interpret information presented visually…and explain how the information contributes to an understanding… ***Suggestion:*** *Put a food chain with the appropriate arrows on the board using the "organism bank" and underneath it put a food web. Ask students to compare and contrast what they see and infer to what makes this difference (more than one animal competing for the same food).*

Procedures	Common Core Standards and Applications
Step 6	
Project **Marine Ecosystem Food Web** (Visual Aid #4). Discuss with students how these organisms in this ecosystem compete with one another for food: ■ Point to the shrimp on the food web. Ask students what organisms use shrimp as a source of energy. (*The Humboldt squid and the Pacific hake*) Tell students that because there are only a certain number of shrimp in the ecosystem, these organisms compete with each other to eat shrimp. ■ Point out the Pacific mackerel on the food web. Ask students which organisms the mackerel eats. (*Primarily anchovies*) Ask students what they think might happen if there were few anchovies but lots of mackerel in an area. (*Competition between mackerel would increase and some might not get enough to eat.*) Ask students what happens in the **Marine Ecosystem Food Web** when "people" are added. (*A lot of arrows would need to be added, because people eat most of these organisms. This means that almost all the organisms are competing with people for their food.*) What might happen to people if the numbers of some of the organisms decreases? (*People might have to switch food sources or compete more for food.*) Explain that this could mean that prices would go up as some foods become harder to get. ***Tip:*** *The more questions presented to the students that have them analyze the effect of adding or taking away a certain organism creates a higher level of thinking.*	**RI.4.7:** Interpret information presented visually…and explain how the information contributes to an understanding… **RI.4.9:** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. ***Suggestion:*** *Students can research different food webs, see* ***Extensions and Unit Resources*** *on page 28 for some website suggestions.*
Step 7	
Tell students to turn to **Food Webs and Competition** (Student Workbook, pages 18–19). Instruct them to use the terrestrial food web to answer the questions. Gather information cards, and string or yarn. Collect **Student Workbooks** and use **Food Webs and Competition** for assessment.	**L.4.3a:** Choose words and phrases to convey ideas precisely.* **W.4.2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

Lesson 4: Changing the Web

Students observe the range of the Humboldt squid and consider how it plays a role in the marine ecosystem off the coast of California. Students then participate in an activity showing how an increase in Humboldt squid affects the ecosystem.


Lesson 4

Changing the Web

In this lesson, students learn that changing or eliminating a component of an ecosystem has consequences for other living things. Students view a map and learn how the Humboldt squid has expanded its range in recent years and is now a component of ecosystems along the Pacific coastline of the United States.

Students consider the consequences of Humboldt squid can lead to in the marine ecosystems found in the Pacific coastal region. They participate in a simulation to show how an increase in the population of Humboldt squid can lead to competition for resources, such as food resources, such as anchovy. Students return to the marine ecosystem food web from Lesson 3 and discuss how the presence of additional Humboldt squid would affect the food web and overall. In addition, students consider the consequences to a marine ecosystem if any one of its organisms is eliminated.

Learning Objective

Background

Key Vocabulary

Use this correlation in place of the **Procedures** on pages 90–92 of the Teacher's Edition.

Procedures	Common Core Standards and Applications
Vocabulary Development	
Use the **Dictionary** and the vocabulary **Word Wall Cards** to introduce new words to students as appropriate.	**L.4.4c:** Consult reference materials…to…determine or clarify the precise meaning of key words and phrases… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 1	
Ask students to describe what they know about the mysterious creature they read about in Lesson 1, the Humboldt Squid. (*Answers should include descriptions of the Humboldt squid, what it eats, where it lives, why it is interesting to people.*) Tell students that the Humboldt squid is mysterious because there are many things about it that we do not know. Read over the vocabulary term for the lesson (*range)* and discuss its meaning with students. Tell students that the Humboldt squid's range has been changing lately, and scientists are starting to ask why. Project **Range of the Humboldt Squid** (Visual Aid #5). Ask students where Humboldt squid were found in 1984. (*They were found along the coasts of Chile, Peru, Central America, and Mexico.*) Ask, "Where were they found in 2001?" (*They were also off the coast of California.*) "Where were they found in 2005?" (*They were also found off the coasts of Oregon, Washington, and as far north as Alaska.*)	**RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text… ***Suggestion:*** *Redistribute the* ***Student Workbook*** *and allow students time to reread the article on the Humboldt Squid.* **RI.4.7:** Interpret information presented visually…and explain how the information contributes to an understanding of the text in which it appears.

Procedures	Common Core Standards and Applications
Step 2	
Redistribute the students' individual **Student Workbooks**. Tell them to turn to ***California Connections: The Mysterious Humboldt Squid*** (Student Workbook, pages 2–6). Ask students to explain in their own words why the squid are moving. Then read the following points taken from the article: ■ Humboldt squid have spread from Chile, Peru and the Gulf of California into more northern waters off the U.S. west coast. They are now found off the coasts of central California, Oregon, Washington, and as far north as Alaska. Scientists do not know why they are moving north. They know that ocean water temperatures are rising. This may be causing the squid to move. For example, there was a five-year period during the 1930s when ocean temperatures were unusually warm. During that time, Humboldt squid were found in large numbers off California and Oregon. But no one knows for sure why the Humboldt squid are moving. ■ What we do know is that now there are over 10 million squid in the waters of Baja California. People who fish there complain that a type of white fish called hake is starting to disappear. They make fish sticks out of hake, a popular food for many people. Jumbo flying squid love to eat hake, too. More squid means less hake, which is a problem for many people. The people who fish for hake do not like to see more squid in the water. The people and squid are competing for the same food. ■ Not everyone is upset about the rising population of Humboldt squid. The town of Santa Rosalia has grown because people eat the squid. The fishery in Santa Rosalia catches up to 100,000 tons of squid every year. More squid in the water means more business for the people who catch them.	**RI.4.2:** Determine the main idea of a text and explain how it is supported by key details… **RI.4.8:** Explain how an author uses reasons and evidence to support particular points in a text. **SL.4.2:** Paraphrase portions of a text…or information presented in diverse media and formats, including visually… and orally. ***Suggestion:*** *Have students review the details that support the main ideas, analyzing the overall structure of the story, including how one idea is connected to the next idea.*
Step 3	
Project **Marine Ecosystem Food Web** (Visual Aid #4). Review the food web and ask students the following questions: ■ Which organisms are sources of energy for the Humboldt squid? (*Sardines, anchovies, mollusks, sardines, Pacific hake, and shrimp*) ■ Which organisms use the Humboldt squid as a source of energy? (*Marlins, seals, and orcas*)	**RI.4.7:** Interpret information presented visually…and explain how the information contributes to an understanding of the text in which it appears. ***Suggestion:*** *Students can partner share answers prior to whole class discussion.*

Procedures	Common Core Standards and Applications
Step 4	
Explain to students that Humboldt squid were rarely found off the coasts of Central California, Oregon, Washington, and Alaska, but in recent years their numbers have increased. Ask: ■ If there are more Humboldt squid in these areas, how might this change the marine ecosystems? (*An increase in Humboldt squid would limit food for organisms that eat the same food as the Humboldt squid. Or, it could be that an increase in the population of Humboldt squid gives more food resources to marlins, seals, and orcas.*) ■ Why should humans care about this? (*They should care because the marine ecosystem provides humans with many food resources. For example, Pacific hake are starting to disappear, and many people need the fish for food.*)	**RI.4.3:** Explain events…ideas, or concepts in a…scientific… text, including what happened and why… ***Suggestion:*** *After discussing student observations and the impact of the Humboldt Squid moving northward, ask students to summarize the similarities and differences between how this food web was effected and how other food webs from the previous lesson was effected. Connect the changes in the next game to these food webs also.*
Step 5	
Tell students that they are going to participate in a **Marine Ecosystem Change Game** that demonstrates how changes to ecosystems can affect the organisms living there. Tell them that the six chairs in the center of the room represent lanternfish. **Round 1:** ■ Prepare by choosing six students to start the game. • Give five students the red "filetail catsharks" label and tell them that they are "filetail catsharks." • Give one student the yellow "Humboldt squid" label and tell this student that they are a "Humboldt squid." • Tell them that when the music starts, these "marine organisms" should walk around the "lanternfish" (chairs), slowly and without touching the chairs or stopping. When the music stops, the "filetail catsharks" and "squid" need to "eat lanternfish" (sit in a chair) to survive. ■ Play the music for 5–10 seconds. After the students have finished the first round, ask them: • What happened? (*The filetail catsharks and the squid ate the lanternfish.*) • What does this mean? (*They all survived to go to the next round.*) • What does this tell them about the food chain in this marine "ecosystem"? (*There were enough lanternfish for both the filetail catsharks and Humboldt squid to eat.)*	**RI.4.7:** Interpret information presented visually, orally, or quantitatively (e.g.,…interactive elements…) and explain how the information contributes to an understanding…

Procedures	Common Core Standards and Applications
Step 5 (Continued)	
Round 2: ■ Prepare by choosing three more students join the game: • Give each new student a yellow "Humboldt squid" label and tell them that they are Humboldt squid that migrated from other areas and now live in this ecosystem. • Have the students who are seated stand and join the new "Humboldt squid." ■ Play the music for 5–10 seconds. After the music stops there should still be some students standing. Ask them: • What happened? (*Only some of the filetail catsharks and/or some of the squid got to eat.*) • What does this mean? (*The filetail catsharks and Humboldt squid are competing more for the same food sources.*) • What does this tell us about the food chain in the ecosystem? (*Now, there are not enough lanternfish for the number of Humboldt squid.*) **Round 3:** ■ Prepare by choosing three more students join the game: • Give each student a yellow "Humboldt squid" label and tell them that they are the offspring of the squid that already live there. • Have the students who are seated stand and join the new "Humboldt squid." ■ Play the music for 5–10 seconds. After the music stops there should still be some students standing. Ask them: • What happened? (*Only some of the filetail catsharks and/or some of the squid got to eat.*) • What does this mean? (*The filetail catsharks and Humboldt squid are competing more for the same food sources.*) • What does this tell them about the food chain in the ecosystem? (*There are now even fewer lanternfish. There are more Humboldt squid and filetail catsharks.*) Repeat the game so that all students get a chance to participate.	**RI.4.7:** Interpret information presented visually, orally, or quantitatively (e.g.,…interactive elements…) and explain how the information contributes to an understanding…
Step 6	
Project **Marine Ecosystem Food Web** again. Have students reflect upon how an increase in the population of the Humboldt squid may change the marine ecosystem in the food web. Ask, "What happens when there are more Humboldt squid added to the marine ecosystem?" (*As the population of the Humboldt squid increases, the organisms that eat the same food have to compete with the squid for the food. Also, as the squid eat more of the food, there is less food for the other organisms. These other organisms might start to die off or move to other areas, which would change the ecosystem.*)	**SL.4.2:** Paraphrase portions of…information presented in diverse media and formats, including visually, quantitatively, and orally.

Procedures	Common Core Standards and Applications
Step 7	
Tell students to turn to **Ecosystem Changes** (Student Workbook, pages 20–21). Using the food web, have students consider what might happen to the ecosystem if one organism from the web were to disappear. Ask them to think about what would happen to the rest of the ecosystem. Collect **Student Workbooks** and use **Ecosystem Changes** for assessment.	**W.4.2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly. **W.4.8:** Recall relevant information from experiences or…from print and digital sources;…paraphrase…

Lesson 5: Changing the Web Means Changing the System

Students read about an event and answer questions about how the food webs in a given ecosystem would be affected by it. Then they discuss the effects the food web disruptions would have on the entire ecosystem and list human actions that have similar results.


Lesson 5

Changing the Web Means Changing the System

Use this correlation in place of the **Procedures** on pages 102–103 of the Teacher's Edition.

Procedures	Common Core Standards and Applications
Vocabulary Development	
Use the **Dictionary** and the vocabulary **Word Wall Cards** to introduce new words to students as appropriate.	**L.4.4c:** Consult reference materials…to…determine or clarify the precise meaning of key words and phrases… **RI.4.4:** Determine the meaning of general academic and domain-specific words or phrases in a text…
Step 1	
Ask students to think about the **Marine Ecosystem Change Game** they played in Lesson 4. Ask them what it meant when there were enough chairs for everyone in the game. (*There were enough sardines available for the orcas and Humboldt squid.*) Then ask what happened when more Humboldt squid entered the ecosystem. (*There were not enough chairs for each student. This meant there was not enough food for all the orcas and Humboldt squid.*) Point out and read over the vocabulary term for this lesson (*disrupt).* Tell students that changes to any part of a food web can disrupt how much energy there is, and when and where organisms get their energy. Ask students what happens when parts of a food web are changed. (*Organisms can have a lot to eat and grow, or have nothing at all, and die or move away.*) Ask students what kinds of things can disrupt a food web. (*Fire, flood, hunting/ fishing, lack of water, and habitat loss*) Point out that some disruptions are caused by natural events, and some are caused by human activities. Give an example of each type; for instance, volcano eruption and pesticide use. Explain to students that they are going to look at what might disrupt a food web in a forest ecosystem, and how that could change the whole forest.	**L.4.4c:** Consult reference materials…to…determine or clarify the precise meaning of key words and phrases… **W.4.8:** Recall relevant information from experiences…

Procedures	Common Core Standards and Applications
Step 2	
Project **Terrestrial Food Web** (Visual Aid #6). Point out that students have seen this food web before, in Lesson 3, when they learned about competition. Ask students to identify organisms that are in competition with each other for energy (food) in this ecosystem. (*The skunk, coyote, owl, and hawk compete with each other for mice; deer, chipmunks, mice, skunks, and coyotes compete with each other for green plants; spiders, toads, skunks, coyotes and chipmunks compete with each other for insects.*) Ask students to explain why the arrows are pointing toward the coyote. (*The arrows point in the direction that the energy flows.*) Point to the pond on the diagram and ask students how the pond is part of the food web. (*The animals in the pond get energy from other animals and plants, such as algae, in the pond. The animals in the pond are sources of energy for animals living outside the pond, too.*) Ask students, "What else does the pond have that is important in the forest ecosystem?" (*Water is important.*) "Why is that important?" (*The plants living in the forest might use the pond water to live. The animals might drink from the pond, too.*) Tell students that there are about to be two events in this forest that will change the forest in different ways.	**RI.4.7:** Interpret information presented visually…and explain how the information contributes to an understanding…
Step 3	
Organize the class into two groups and have students pair up within each group. Redistribute the students' individual **Student Workbooks**. Tell one group to turn to **Outbreak!** (Student Workbook, pages 22–24) and the other group to turn to **Earthquake!** (Student Workbook, pages 25–27). In pairs, have students read the top part of the page that tells about the event and the terrestrial food web. When they finish reading, ask partners to work together to answer the questions that follow the article. Tell students they have 20 minutes to complete the assignment.	**RI.4.1:** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. **RI.4.3:** Explain events, procedures, ideas, or concepts in a… scientific…text, including what happened and why based on specific information in the text. **W.4.2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly. d) Use precise language and domain-specific vocabulary to inform about or explain the topic.
Step 4	
When time is up, ask the students to share their answers to the questions about each event. Direct students' attention to the **Ecosystem Changes Affect Food Webs Chart**. Have students discuss the articles from **Outbreak!** and **Earthquake!** Record students' responses in the Outbreak! and Earthquake! columns of the **Ecosystem Changes Affect Food Webs Chart**. (*Note: An Answer Key and Sample Answers for* ***Ecosystem Changes Affect Food Webs Chart*** *is provided on page 104.*)	**SL.4.1d:** Review the key ideas expressed and explain their own ideas and understanding in light of the discussion. **SL.4.2:** Paraphrase portions of a text…or information presented…

Procedures	Common Core Standards and Applications
Step 5	
Tell students that disruptions to the food web may mean that organisms have more or less to eat, or have more or less competition for food, and that is just the beginning of possible consequences. Project **Terrestrial Food Web** again and ask students to imagine the following scenarios and figure out what might happen. (*Note: Cover each organism as you talk about it to suggest removal or reduction from the ecosystem.*) ■ What might happen if people started to cut down the trees in this forest so they could build houses in the area? (*There would be fewer places for animals to find shelter; the deer and chipmunks and other animals that live in the forest would start to get more crowded and would compete even more. Some animals might not be able to get enough food and would have to move away, or they might die.*) ■ What might happen if people near the forest used pesticides to kill insect pests, and the wind and water carried the pesticides to the forest? (*Insects in the forest might die off. Spiders, toads, fish, coyotes, chipmunks, and skunks would have trouble finding food and might have to move away, or possibly die. Then owls and hawks might also have trouble finding food and might have to move away, or die. Without these predators, some small animals like mice and chipmunks might increase in numbers. The numbers and kinds of animals in the forest would all change.*) Explain that if something changes in a food web, it changes the whole ecosystem. Tell students that sometimes this means a really big change, such as one kind of ecosystem changing to another kind of ecosystem.	**RI.4.7:** Interpret information presented visually, orally, or quantitatively…and explain how the information contributes to an understanding of the text in which it appears. **W.4.7:** Conduct short research projects that build knowledge through investigation of different aspects of a topic. ***Suggestion:*** *Students can write about their scenario in a report, researching possible effects of the proposed threats.*
Step 6	
Return to the **Ecosystem Changes Affect Food Webs Chart**. Ask students, "What other events disrupt food webs in ecosystems, causing them to change?" Write students' responses in the "Other Events." Ask students, "What types of human activities can disrupt food webs in ecosystems, causing them to change?" Write students' responses in the "Human Activities" column. Explain to students that because we (humans) are part of all ecosystems, and because we live and work in all regions on Earth, what we do affects food webs and ecosystems everywhere. Collect **Student Workbooks** and use **Outbreak!** and **Earthquake!** for assessment.	**RI.4.3:** Explain events, procedures, ideas, or concepts in a…scientific…text, including what happened and why based on specific information in the text. **W.4.8:** Recall relevant information…from print and digital sources…paraphrase, and categorize information…

California Common Core State Standards Descriptions

Language Standards

- **L.4.3:** Use knowledge of language and its conventions when writing, speaking, reading, or listening.
  a) Choose words and phrases to convey ideas precisely.*
- **L.4.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grade 4 reading and content,* choosing flexibly from a range of strategies.
  c) Consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation and determine or clarify the precise meaning of key words and phrases **and to identify alternate word choices *in all content areas*. CA**

Reading Standards for Informational Text

- **RI.4.1:** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.2:** Determine the main idea of a text and explain how it is supported by key details; summarize the text.
- **RI.4.3:** Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
- **RI.4.4** Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*. **(See grade 4 Language standards 4–6 for additional expectations.) CA**
- **RI.4.7:** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
- **RI.4.8:** Explain how an author uses reasons and evidence to support particular points in a text.
- **RI.4.9:** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably

Speaking and Listening Standards

- **SL.4.1:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.
  a) Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
  b) Follow agreed-upon rules for discussions and carry out assigned roles.
  c) Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.
  d) Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
- **SL.4.2:** Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **SL.4.4:** Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
- **SL.4.5:** Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

Common Core Reference Pages

Writing Standards

- **W.4.1:** Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

  b) Provide reasons that are supported by facts and details.

- **W.4.2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

  d) Use precise language and domain-specific vocabulary to inform about or explain the topic.

- **W.4.7:** Conduct short research projects that build knowledge through investigation of different aspects of a topic.
- **W.4.8:** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes, paraphrase, and categorize information, and provide a list of sources.